ET 420197665US

MANAGING CALLER PROFILES ACROSS MULTIPLE HOLD QUEUES ACCORDING TO AUTHENTICATED CALLER IDENTIFIERS

5 ## CROSS-REFERENCE TO RELATED APPLICATIONS

The present application is related to the following co-pending applications:

10   (1) U.S. Patent Application No. ___/_____ (Attorney. Docket No. AUS920010825US1);

    (2) U.S. Patent Application No. ___/_____ (Attorney Docket No. AUS920010826US1);

15   (3) U.S. Patent Application No. ___/_____ (Attorney Docket No. AUS920010827US1);

    (4) U.S. Patent Application No. ___/_____ (Attorney Docket No. AUS920010830US1); and

20   (5) U.S. Patent Application No. ___/_____ (Attorney Docket No. AUS920010944US1).

BACKGROUND OF THE INVENTION

1.   Technical Field:

The present invention relates in general to telecommunications and, in particular, to call hold centers. Still more particularly, the present invention relates to managing caller hold times across multiple hold queues according to authenticated caller identifiers.

2.   Description of the Related Art:

Many companies provide telephone-based access to help staff, sales personnel, representatives, and automated menus via a call center. Where high telephone call traffic is typical in telephone access to a company's representatives, a PBX system receives the call and distributes the call to an automatic call distributor (ACD), thus incorporating a hold function in the call center. ACDs are often employed to provide an even and systematic distribution of incoming calls to multiple representatives. In particular, ACDs typically provide incoming calls with a direct connection to an available representative until all representatives are busy. Then, calling parties are placed in a call queue, and selectively connected to a representative once a representative comes available.

Call queues may cause frustration and ill will of consumers towards a company, particularly where excessively long waits, full queues and accidental disconnects are encountered. One way to alleviate some of the frustration associated with call queues

is by specifying services and information provided to the caller while a caller waits in a call queue. For example, automated messages output to a caller, while the caller is on hold in a call hold queue, may be specified according to the products owned

5   by a caller, the caller's expertise and messages that have been previously played to the caller while on hold.

However, call systems are limited in that each individual call center stores an individual profile for specifying services, requiring a caller to enter a new profile at each call center;

10   requiring a new profile entry at each call center is time consuming and cancels the advantages of specified output. In addition, a caller may only call an individual call center one time, store a profile with the individual call center, and never call the individual call center again to take advantage of the

15   logged profile, thus wasting resources and time.

A further disadvantage of current hold queue systems is that where multiple queues are selectable within a hold queue system, the caller may not always select the proper queue or may need to access multiple representatives where accessing each of the

20   representatives requires waiting in a separate queue within a single call. In such cases, the caller will wait in a first queue to speak to a first representative, only to find out that the caller must wait in an additional queue to speak to a second

25   representative.

Therefore, in view of the foregoing, it would be advantageous to provide a method, system, and program for storing

30   and managing caller profiles including hold times within a call center at a single remote caller profile server that distributes

the caller profiles to multiple call centers and multiple hold
queues within a single or multiple call centers. In addition, in
view of the foregoing, it would be advantageous to preserve a
caller's current time investment in a call center in order to
5   adjust a caller's position in each hold queue in that call center
and across multiple call centers dependent upon previous hold
queue times.

SUMMARY OF THE INVENTION

In view of the foregoing, it is therefore an object of the
present invention to provide an improved telecommunications
system.

It is another object of the present invention to provide a
method, system and program for improved call hold queues.

It is yet another object of the present invention to provide
a method, system and program for managing caller hold times
across multiple hold queues according to authenticated caller
identifiers.

According to one aspect of the present invention, a request
is received at a caller profile server accessible in a
telecommunications network for a caller profile according to an
authenticated identifier of a caller currently on hold within a
hold queue of a call center. The caller profile is distributed
to the call center according to the authenticated identifier,
wherein the caller profile is accessible across a multiple call
centers according to the authenticated identifier.

According to yet another aspect of the present invention, a
call is received from a caller, wherein an identity of the caller
is authenticated. The call is placed in a hold queue. A caller
profile associated with the identity of the caller is received
from the caller profile server. Then, services provided to the
caller while on hold may be specified according to the caller
profile. In addition, a current position of the call in the hold

queue may be adjusted according to a previous hold history for the caller specified in the caller profile, such that previous time spent holding by said caller is given value.

5   All objects, features, and advantages of the present invention will become apparent in the following detailed written description.

BRIEF DESCRIPTION OF THE DRAWINGS

The novel features believed characteristic of the invention are set forth in the appended claims. The invention itself however, as well as a preferred mode of use, further objects and advantages thereof, will best be understood by reference to the following detailed description of an illustrative embodiment when read in conjunction with the accompanying drawings, wherein:

Figure 1 illustrates a block diagram of a telecommunications network in which the present invention may be implemented;

Figure 2 depicts a block diagram of a network call center system in which the present invention may be implemented;

Figure 3 illustrates a block diagram of a caller profile server in accordance with the method, system, and program of the present invention;

Figure 4 depicts a block diagram of an on hold system in accordance with the method, system, and program of the present invention;

Figure 5 illustrates a representative portion of a caller profile database within a caller profile server is provided in accordance with the method, system, and program of the present invention;

Figure 6 depicts an illustration of a shift in the position of a call in a hold queue according to on hold points in accordance with the method, system, and program of the present

invention;

Figure 7 illustrates a high level logic flowchart of a process and program for controlling a switching network in accordance with the method, system, and program of the present invention;

Figure 8 depicts a high level logic flowchart of a process and program for controlling a PBX system within a call center in accordance with the method, system, and program of the present invention;

Figure 9 illustrates a high level logic flowchart of a process and program for controlling an on hold system in accordance with the method, system, and program of the present invention; and

Figure 10 depicts a high level logic flowchart of a process and program for controlling a caller profile server in accordance with the method, system, and program of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

A method, system, and program for managing caller profiles for multiple callers across multiple call hold queues are provided. For purposes of the present invention, a caller profile is identified by a subscriber voice identifier (VID) and includes, but is not limited to, personal information about a subscriber, products and services purchased by a subscriber, information service preferences of a subscriber, competition services of a subscriber, survey preferences of a subscriber, and activity performed by a subscriber while on hold across multiple call centers. In addition, a caller profile includes tracking of the current hold times and points granted for a particular call according to current hold times. According to the present invention, it is advantageous that a caller profile be tailored to information that aids specification of on hold activities, however a caller profile may incorporate information utilized for multiple purposes, in addition to specification of on hold activities.

For purposes of the present invention, telephony devices are termed origin devices when utilized for origination of a call to an intermediary device and are termed destination devices when utilized for receipt of a call from an intermediary device. Subscribers to a call are termed callers when originating a call and are termed callees when receiving a call. Callers and callees may or may not be line subscribers to the particular telephony device utilized.

In the following description, for the purposes of explanation, numerous specific details are set forth to provide a

thorough understanding of the present invention. It will be apparent, however, to one skilled in the art that the present invention may be practiced without these specific details. In other instances, well-known structures and devices are shown in

5 block diagram form to avoid unnecessarily obscuring the present invention.

The present invention may be executed in a variety of systems, including a variety of telephone systems, computing

10 systems, and electronic devices under a number of different operating systems. In one embodiment of the present invention, the on hold call queue system is a computer system that incorporates communication features that provide telephony, messaging, and information services to a plurality of callers.

15 In general, the present invention is preferably executed in a computer system that performs computing tasks such as manipulating data in storage that is accessible to the computer system.

20 With reference now to the figures, and, in particular, with reference now to **Figure 1**, there is depicted a block diagram of a network environment in which the present invention may be implemented. While the present invention is described with reference to one type of network environment, it will be

25 understood by one with skill in the art that the present invention may be implemented in alternate types of network environments.

GENERAL NETWORK ENVIRONMENT

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First, the network environment incorporates a Public

Switching Telephone Network (PSTN) **10**. As is known in the art
the core of PSTN **10** may include multiple telephone networks, each
owned by one of multiple independent service providers. Each
telephone line is carried by an independent service provider

5   within PSTN **10** and is typically assigned to at least one
subscriber.

Switching of a call within an independent service provider's
telephone network is considered trusted movement within a trusted

10   network because the call remains within the company's telephone
network infrastructure. However, calls may be transferred from
one service provider's telephone network to another service
provider's telephone network in generally trusted movement.
Generally, service providers are in competition with one another

15   and therefore there is general trust in transferring a call, but
not trust in sharing of subscriber information from one service
provider to the next without security features.

Advantageously, each telephone network within PSTN **10** may

20   access a data network functioning as an extension to PSTN **10** via
an Intranet. Data networks may include, for example, subscriber
profiles, billing information, and preferences that are utilized
by a service provider to specialize services. Transfer of
information between a service provider's data network and

25   telephone network is trusted movement in sharing of information.

Further, each telephone network within PSTN **10** may access
server systems external to PSTN **10** in the Internet Protocol over
the Internet or an Intranet. Such external server systems may

30   include an enterprise server, an Internet service provider (ISP),
an access service provider (ASP), a personal computer, and other

computing systems that are accessible via a network. In the present embodiment, transfer of information between PSTN **10** and server systems accessible via network **20** is totally untrusted and therefore may require authentication and additional security.

In the present invention, network **20** may comprise a private network, Intranet, or a public Internet Protocol network. Specifically, telco application server **22**, generic application server **24**, pervasive application server **26**, and systems management server **28** represent server systems external to PSTN **10** that may be accessed by PSTN **10** over network **20**.

In particular, telco application server **22** preferably includes multiple telco specific service applications for providing services to calls transferred to a server external to PSTN **10**. In particular, a call may be transferred from PSTN **10** to telco application server **22** to receive at least one service and then the call is transferred back to PSTN **10**. Such services may also be provided to calls within PSTN **10**, however placing such services at a third party such as telco application server **22**, is advantageous because adding services and information to PSTN **10** is time consuming and costly when compared with the time and cost of adding the services through telco application server **22**.

In accord with an advantage of the present invention, as will be further described, the identity of both the caller and the callee may be authenticated by one of telephony devices **8a-8n**, PSTN **10**, or by telco application server **22**. By authenticating the actual identity of the person making a phone

call and the person receiving the phone call, rather than the identification of a device from which a call is made and received, an enhanced specialization of services to subscribers may be performed.

An authentication service within telco application server **22** may include identification and verification of the identity of a caller and/or callee of a particular call. Such a service may require that subscribers provide voice samples when setting up a subscription. The stored voice samples may then be compared against voice samples received for a particular call in order to authenticate the identity of a current caller or callee of the particular call.

Generic application server **24** preferably accesses independent server systems that provide services. For example, a messaging server, a financial server, an Internal Revenue Service (IRS) server, and database management system (DBMS) server may be accessed in HTTP via network **20**. Each of these servers may include a telco service application that requires authentication of the subscriber before access is granted. For example, a financial server may provide a telco service application that allows an authenticated subscriber to access current financial records and request stock quotes from the financial server.

Pervasive application server **26** manages services for wirelessly networked devices. In particular, pervasive application server **26** preferably handles distribution of wireless packets of voice and data to wirelessly networked devices utilizing a standard such as short messaging service (SMS) messaging or other 3G standards.

Systems management server **28** manages subscriber personalization via the web. In particular, systems management server **28** includes browser technology that includes a

5 provisioning console **30** for establishing a subscriber profile and a management console **32** for managing and updating the subscriber profile. A subscriber preferably accesses the consoles of systems management server **28** via the Internet utilizing a computing system, such as computing systems **34a-34n**.

The subscriber profile may be accessed at systems management server **28** by other external servers and PSTN **10** via network **20**. In addition, a local copy of a subscriber profile updated in systems management server **28** may be stored within a particular

15 service provider's data network or telephone network. Further, as will be described, a subscriber profile is preferably updated in a caller profile server accessible to call centers **16a-16n**. Each service provider may specify the types of preferences and other information included within a subscriber profile.

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In particular, a subscriber may provide a voice imprint when establishing a subscriber profile through provisioning console **30**. Other types of authentication information may also be provided including, but not limited to, a password, an eye scan,

25 a smart card ID, and other biometric information. In addition, a subscriber may designate billing preferences, shopping preferences, buddy list preferences, and other preferences that enable specialized service to the subscriber when the subscriber's identity is authenticated from the voice imprint or

30 other identification.

Advantageously, a management agent is built into each
external server to monitor the services provided by each server
according to the authenticated subscriber receiving the services.
By monitoring service output according to subscriber, the
5   subscriber may then be billed according to each use of a service.

PSTN **10** preferably includes both voice and data signaling
networks that interface with network **20** via gateways. Each of
the gateways acts as a switch between PSTN **10** and network **20** that
10   may compress a signal, convert the signal into Internet Protocol
(other protocol) packets, and route the packets through network
20 to the appropriate server.

In particular, the voice network interfaces with network **20**
through media gateway **14** which supports multiple protocol
15   gateways including, but not limited to, SIP. SIP is a signaling
protocol for Internet conferencing, telephony, presence, events
notification and instant messaging.

In addition, in particular, the data signaling network
20   interfaces with network **20** through signaling gateway **12** which
supports multiple protocol gateways including, but not limited
to, parlay protocol gateways and SS7 protocol gateways. Internet
servers, such as telco application server **22** may include protocol
25   agents that are enabled to interact with multiple protocols
encapsulated in Internet Protocol packets including, but not
limited to, SS7 protocol, parlay protocol, and SIP.

30   PSTN IDENTITY AUTHENTICATION AND CALL CONTROL

Looking into PSTN **10**, a telephone network typically includes multiple switches, such as central office switches **11a-11n**, that originate, terminate, or tandem calls. Central office switches **11a-11n** utilize voice trunks for transferring voice

5 communications and signaling links for transferring signals between signaling points.

Between signaling points, one central office switch sends signaling messages to other central office switches via signaling

10 links to setup, manage, and release voice circuits required to complete a call. In addition, between signaling points, central office switches **11a-11n** query service control points (SCPs) **15** to determine how to route a call. SCPs **15** send a response to the originating central office switch containing the routing

15 number(s) associated with the dialed number.

SCPs **15** may be general purpose computers storing databases of call processing information. While in the present embodiment SCPs **15** are depicted locally within PSTN **10**, in alternate

20 embodiments SCPs **15** may be part of an extended network accessible to PSTN **10** via a network.

One of the functions performed by SCPs **15** is processing calls to and from various subscribers. For example, an SCP may

25 store a record of the services purchased by a subscriber, such as a privacy service. When a call is made to the subscriber, the SCP initiates an announcement to a caller to identify themself to the subscriber with the privacy service who is being called. According to an advantage of the invention, authentication of the

30 subscriber receiving the call may be required before the privacy service is initiated for that subscriber.

In particular, network traffic between signaling points may be routed via a packet switch called a service transfer point (STP) **13**.   STP **13** routes each incoming message to an outgoing

5   signaling link based on routing information.   Further, in particular, the signaling network may utilize an SS7 network implementing SS7 protocol.

Central office switches **11a-11n** may also send voice and

10   signaling messages to intelligent peripherals (IP) **17** via voice trunks and signaling channels.   IP **17** provides enhanced announcements, enhanced digit collection, and enhanced speech recognition capabilities.

15   According to an advantage of the present invention, the identity of a caller is authenticated according to voice authentication.   Voice authentication is preferably performed by first identifying a subscriber by matching the name or other identifier spoken with a subscriber name or identifier.   Next,

20   voice authentication requires verifying that the voice audio signal matches that of the identified subscriber.   However, in alternate embodiments, the identity of a subscriber may be authenticated according to passwords, eye scans, encryption, and other biometric methods.

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In particular, to perform subscriber authentication of audio signals received from callers, IP **17** may include storage for subscriber specific templates or voice feature information, for use in authenticating subscribers based on speech.   If a

30   subscriber specific template is not stored on a local IP **17**, then a remote IP containing the subscriber specific template may be

accessed via a network. In addition, local IP **17** may access
systems management server **28** or another repository for voice
imprints to access the subscriber specific template.

Where IP **17** authenticates the identity of a caller (e.g. the

5   subscriber placing a call), a voice identifier (VID) representing
the authenticated caller identity is transferred as a signal for
identifying the caller. In addition, where IP **17** authenticates
the identity of a callee (e.g. the subscriber receiving a call),
a reverse VID (RVID) including the callee identity is transferred

10 as a signal for identifying the callee.

Advantageously, VIDs indicate through text, voice, or video
the identity of a caller. For example, a caller's name may be
transferred as the identity of a caller. Alternatively, a video
15 clip stored with the subscriber template may be transferred as
the identity of a caller. Additionally, VIDs may indicate the
identity of the device utilized by a caller to provide context
for a call. Further, VIDs may indicate which system or systems
have authenticated the caller identity.

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After a VID and/or RVID are determined by IP **17**, IP **17** and
SCP **15** may communicate to designate which services are available
according to VID and RVID. Advantageously, by designating
services according to a VID and/or RVID, caller and callees are
25 provided with services and billed for those services independent
of the devices utilized. In particular, a 1129 protocol or other
protocol may be utilized to enable signal communications between
IP **17** and SCPs **15**. In addition, as previously described, caller
authentication to determine VIDs and RVIDs may be performed by a
30 third party, such as telco application server **22**.

An origin telephony device or destination telephony device may also determine a VID and/or RVID for the caller and/or callee of a call. In particular, telephony devices **8a-8n** and call centers **16a-16n** may function as origin and designation telephony

5 devices. Each of the telephony devices may include a database of voice templates that may be matched to authenticate the identity of a caller or callee. In addition, each of the telephony devices may access a third party, such as telco application server **22,** to authenticate the identity of the caller or callee.

10 In either case, the telephony device transmits a VID and/or RVID with a call to PSTN **10.**

Telephony devices **8a-8n** may include, but are not limited to wireline devices, wireless devices, pervasive device equipped

15 with telephony features, a network computer, a facsimile, a modem, and other devices enabled for network communication. Advantageously, as previously described, a voice authentication functioning device may be included in each of telephony devices **8a-8n.**

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In addition, telephony devices **8a-8n** may each incorporate a display that provides a visual output of a VID or RVID. Alternatively, such a display may be provided in a separate device connected to the line in parallel to telephones **8a-8n.**

25 According to one advantage of the present invention, the identity of the actual caller or actual callee are output to a display in association with a call. In addition, other context information about the caller including, but not limited to, the device from which the call originates or is answered, ratings for a caller or

30 callee, and other context information may be output to a display in association with a call.

Telephony devices **8a-8n** are communicatively connected to
PSTN **10** via wireline, wireless, ISDN, and other communication
links. Preferably, connections to telephony devices **8a-8n**
5   provide digital transport for two-way voice grade type telephone
communications and a channel transporting signaling data messages
in both directions between telephony devices **8a-8n** and PSTN **10.**

In addition to telephony devices **8a-8n,** advanced telephone
10   systems, such as call centers **16a-16n,** may be communicatively
connected to PSTN **10** via wireline, wireless, ISDN and other
communication links. Call centers **16a-16n** may include PBX
systems, hold queue systems, private network systems, and other
systems that are implemented to handle distribution of calls to
multiple representatives or agents.

Returning to central office switches **11a-11n,** typically, one
central office switch exists for each exchange or area served by
the NXX digits of an NXX-XXXX (seven digit) telephone number or
20   the three digits following the area code digits (NPA) in a ten-
digit telephone number. The service provider owning a central
office switch also assigns a telephone number to each line
connected to each of central office switches **11a-11n.** The
assigned telephone number includes the area code (NPA) and
25   exchange code (NXX) for the serving central office and four
unique digits (XXXX).

Central office switches **11a-11n** utilize office equipment
(OE) numbers to identify specific equipment, such as physical
30   links or circuit connections. For example, a subscriber's line
might terminate on a pair of terminals on the main distribution

frame of one of central office switches **11a-11n**. The switch
identifies the terminals, and therefore a particular line, by an
OE number assigned to that terminal pair. For a variety of
reasons, a service provider may assign different telephone

5   numbers to the one line at the same or different times. For
example, a local carrier may change the telephone number because
a line subscriber sells a house and a new line subscriber moves
in and receives a new number. However, the OE number for the
terminals and thus the line itself remains the same.

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        On a normal call, a central office switch will detect an
off-hook condition on a line and provide a dial tone. The switch
identifies the line by the OE number. The central office switch
retrieves profile information corresponding to the OE number and

15   off-hook line. Then, the central office switch receives the
dialed digits from the off-hook line terminal and routes the
call. The central office switch may route the call over trunks
and possibly through one or more central office switches to the
central office switch that serves the called party's station or

20   line. The switch terminating a call to a destination will also
utilize profile information relating to the destination, for
example to forward the call if appropriate, to apply distinctive
ringing, etc.

25   In the present invention, when a central office switch
detects an off-hook condition on a line, the central office
switch will then determine if a VID signal is transferred from
the off-hook telephony device. If a VID is transferred, then a
query is made to SCP **15** according to the VID for any services

30   specified for the authenticated caller. Alternatively, a query
may be transferred via network **20** to an external server, such as

system management server **28**, to determine the services specified
for the caller. The central office switch will then receive the
dialed digits from the off-hook line terminal and route the call,
providing services according to those preferred by the
5   authenticated subscriber.

Alternatively, if a VID signal is not transferred from the
off-hook telephony device, then the central office switch will
provide a dial tone and transfer the call to an IP that prompts
10   the caller to provide a voice entry or other identification.
Alternatively, the central office switch may transfer the call to
telco application server **22** for use of the caller authentication
service. In either case, the identity for the caller is
preferably authenticated, the call is transferred back to the
15   central office switch, services are provided according to the VID
authenticated for the caller, and the call is routed according to
dialed digits from the off-hook line terminal.

In addition, an RVID may be provided in the present
20   invention to authenticate the identity of a callee receiving the
call. When a call is answered, the call is transferred back to
an IP or telco application server **22** to authenticate the identity
of the callee answering the call.

25   As another alternative to dialed digits from the off-hook
line terminal, a caller may utilize a voice calling function of a
telephony device for indicating how the call should be routed.
For example, a caller may say the name of a preferred callee.
The device or IP **17** may determine a person within the caller's
30   calling list that matches the voiced name. The matching person's
digits are then utilized to route the call.

CALL CENTER ENVIRONMENT

Referring now to **Figure 2,** there is an illustrative network
call center environment in which the present invention may be
implemented. It will be appreciated by one with skill in the art
that although a particular call center environment is described
below, the invention is not limited to use within the described
network environment, rather, the inventive queue position
advancement process may be implemented within any on-hold
information service regardless of the telephony environment.

As illustrated, multiple incoming calls are received at a
call center **16a**. In particular, a connection **38** includes a voice
trunk and a signal link, such that both voice and VID signals may
be received at PXB **40** from PSTN **10**. Connection **38** is preferably
connected to PSTN **10** via a wireline, wireless, Internet Protocol
network, or other connection. PBX **40** distributes incoming calls
to multiple representative terminals **44a-44n** via connection **39,**
wherein connection **39** also includes a voice trunk and a signal
link. In particular, PBX systems, and in particular PBX systems
with automatic call distribution (ACD) ability, are well known in
the art as switching systems designed to received telephone calls
destined for call center **16a** and to queue those call when a call
handling agent is not available.

In the description which follows, it will be assumed that
all representative terminals **44a-44n** are busy and therefore PBX
40 cannot respond to an incoming call by making a direct
connection to one of representative terminals **44a-44n.** As a
result, PBX **40** is forced to place the incoming call on hold.

However, an advantage of the present invention is that when a
call is transferred to one of representative terminals **44a-44n,**
the VID for the call is also transferred, enabling a
representative to receive an authenticated identity of a caller,
5   rather than just the line number from which a call is placed and
the name of the subscriber of that line number. Additional
authentication may be required by PBX **40** where callers are
accessing sensitive information from representatives.

10   After placing the incoming call on hold, the VID, time of
call, and other information received by PBX **40** are forwarded to
on hold system **42.** On hold system **42** preferably creates a record
based on the call and positions the call within one of call
queues **46a-46n.** In particular, the call queue selected for a
15   call is specified by a caller indication of the subject matter of
a call. In addition, a single call queue may be utilized to
store all calls on hold.

While in the present embodiment PBX **40** forwards calls to a
20   single on hold system, in alternate embodiments, PBX **40** may
forward calls to multiple on hold systems and to multiple call
centers. In addition, on hold system **42** and other on hold
systems may be coupled to PBX **40** or may be remotely accessed by
PBX **40.** Further, while in the present embodiment on hold system
25   **42** is depicted as an independent system, on hold system **42** may
also be incorporated within PBX **40.**

While the call is on hold, an interactive voice response
unit (IVRU) **41,** coupled to PBX **40** and on hold system **42,** may
30   offer the caller a menu of available options for receiving call
hold queue information for on hold system **42.** In general, IVRU

41 is a voice information system which may be arranged to (i)
prompt a caller for specific information by asking questions
based on a set of modules in a transactions script, (ii) collect
that information by detecting and interpreting dual tone

5   multifrequency (DTMF) signals entered by the caller or by
recognized speech input by the caller, (iii) organize the
collected information in a specific format and (iv) forward the
collected information to be utilized within on hold system **42**.
For purposes of the present invention, prompts to the caller may

10 be in voice, text, video, and/or graphical formats depending on
the interface receiving the prompt. In addition to or as an
alternative to IVRU **41**, a voice browser may be utilized interact
with a caller according to voice XML scripted pages.

15   According to one advantage of the present invention, a
caller profile for the VID may be accessed by on hold system **42**
from a caller profile server **50**. On hold system **42** may then
utilize the caller profile to specify the menu of available
options and other services provided to the caller while the

20 caller is on hold. In particular, a caller profile may include
hold points or previous hold times calculated for a caller. On
hold system **42** may utilize the hold points to determine whether a
caller should be adjusted in position within a call hold queue.

25   Caller profile server **50** preferably includes profiles for
multiple callers stored according to VIDs that are accessible
across multiple call centers **16a-16n**. Caller profile server **50**
may be located within the extended network of PSTN **10** as a
database that is preferably shared across multiple service

30 providers accessible via an Intranet. Alternatively, as
depicted, caller profile server **50** may be located in the external

network of PSTN **10**, where the external network is available via
network **20**.

     As illustrated, on hold system **42** accesses caller profile
5   server **50** via network **20**. Advantageously, by storing caller
     profiles in caller profile server **50** according to VID, only a
     single identifier is needed to access a caller profile and only a
     single location is provided for access to a caller profile.
     Further, advantageously, a caller is only required to enter
10   preferences and other information in one location, for storage
     according to VID, where the information is then accessible to
     multiple diverse call centers and other systems. As an
     additional advantage, different portions of a caller profile may
     be stored in different server system locations, but each
15   referenced for a single caller according to that caller's VID.

     In addition to requesting caller profiles, on hold system **42**
     may transmit caller on hold activity to caller profile server **50**
     according to a caller VID. On hold activity may include the
20   options selected by a caller while on hold, the times a caller
     waited in call hold queues, and the time that a caller spent with
     a representative, for example.

     According to another advantage of the present invention, a
25   VID may be authenticated by on hold system **42** and transmitted
     with requests for caller profiles and logging of caller on hold
     activity. In particular, call center **16a** may provide
     authentication of the identity for on hold system **42** in a VID.
     Alternatively, PSTN **10** or telco application server **22** may
30   authenticate the identity of on hold system **42**. Moreover, caller
     profile server **50** may authenticate the identity on hold system

42. In this case, authentication may be performed with a password sequence, security protocol, biometric input, encryption, or other secure format.

5   By requiring an on hold system to authenticate transmissions, caller profile server **50** may ensure that only those on hold systems that have subscribed to the service or are verifiable on hold systems, will receive caller profiles. In addition, a VID of an on hold system may by utilized to specify
10   the types of information within a caller profile that are provided to a particular on hold system.

          According to further advantage of the present invention, a caller profile may be initiated and adjusted while on hold and off hold. In particular, a profile for a caller may be initiated
15   and added to from any subscribing call center while a caller is on hold. In addition, a profile for a caller may be initiated and adjusted by the caller via a web site interface to caller profile server **24** off-line. In particular, such an interface may
20   be provided by systems management server **28,** as described in **Figure 1.**

          Referring now to **Figure 3,** there is an illustrative block diagram of a caller profile server in accordance with the method,
25   system, and program of the present invention. As depicted, a caller profile server **50** includes a caller profile controller **56** for controlling the functions of caller profile server **50.** In particular, caller profile controller **56** may include at least one processor, memory, data storage, system software, and application
30   software that function together.

Caller profile server **50** also includes a call center client database **52**. Advantageously, call centers may be required to subscribe to use of call profile server **50**. In subscribing to use of call profile server **50,** a call center may specify the types of information from a caller profile that are transmitted in response to a request from that call center for a caller profile. Preferably, registered call centers may be stored in call center client database **52** according to call center or on hold system VID. Further, registered call centers may be required to sign a privacy statement that is filed with the call center identifier, to ensure that personal caller information is only utilized privately by the registered call centers.

In addition, caller profile server **50** includes a caller profile database **54**. Caller profile database **27** preferably includes multiple caller profiles stored for multiple callers, where each caller is identifiable by a VID. Caller profiles may include personal information, service preferences, product and service purchase records, previous hold activities, current wait history, and other information that is provided by a caller or monitored by a call center and transferred to call profile server **24**. In addition, a caller profile may include preferences for types of token advancement systems and records of extra tokens earned by the caller for redemption in future calls. Further, a caller profile may include preferences for the interface and format of publication of hold queue information.

In particular, in the present invention, the current wait history for a caller may be further specified according to the hold times of a caller across multiple hold queues, where those hold queues may be within a single on hold system, multiple on

hold systems, and multiple call centers. Caller profile
controller **56** may calculate on hold points that are
representative of current hold times dependent upon factors
including, but not limited to, the support policy of a call
5   center, the caller's standing, previous problem history, and a
reason for transferring between hold queues. A formula, such as
Apoints +' minutes * rate@ may be implemented to calculate the on
hold points, where the rate is determined by the above factors.

10   With reference now to **Figure 4**, there is an illustrative
block diagram of an on hold system in accordance with the method,
system, and program of the present invention. As illustrated, on
hold system **42** includes a controller **50**, call hold queues **46a-
46n,** a network interface **64**, and a data storage system **62**
15   communicatively connected via a bus **63**. Additional systems may
be connected along bus **63** that are not depicted herein. In
particular, controller **60** comprises conventional computer
resources including, but are not limited to, at least one
processor, memory, a data storage system, system software and
20   application software, that function together to perform the
functions described with reference to controller **60**.

Network interface **64** preferably communicates with PBX **10** via
a telephone network or other networking system. In addition,
25   network interface **64** may communicate with network **20** in order to
access caller profile server **50**. In particular, network
interface **34** receives transfers of calls from PBX **40** and then
returns calls to PBX **40** when a call is the next in line within
one of call hold queues **46a-46n.**
30
In the present invention, while a call is holding within one

of call hold queues **46a-46n**, the caller is preferably prompted by
IVRU **41** to select from the multiple available service options
designated in call queue service options database **68**. However,
according to an advantage of the present invention, the service
5   options are first filtered according to the caller profile
associated with the VID of the caller, such that the caller is
only presented with those options that are specifically
designated by the caller and those options which are tailored to
the caller according to the caller profile.

10   A caller profile may be stored locally to on hold system **42**
according to VID in caller profile database **66**. In addition,
according to an advantage of the present invention, a caller
profile may be accessed remotely according to VID from caller
15   profile server **50**.

Caller profiles returned from caller profile server **50** may
be stored in caller profile database **66** to supplement or start a
caller profile for a particular VID. In particular, it may be
advantageous for on hold system **42** to manage a local caller
20   profile for each VID, in addition to accessing the caller profile
from caller profile server **50,** where the caller profile includes
purchases made by the caller and other information that the
caller has specifically disclosed to the on hold system in
privacy. In addition, a local caller profile stored in caller
25   profile database **66** advantageously includes a record of current
wait history specifically within on hold system **42,** where points
are tabulated when callers wait in hold queues.

After a caller selects a service option, the activity of the
30   caller, while on hold, is preferably monitored by on hold system
42. In particular, the on hold system may monitor the types of

music, news or other audio information listened to, the competitions participated in, the third-parties accessed, and other activities that a caller may participate in while on hold. The monitored activity may be added to the local caller profile

5 according to VID in caller profile database **66**. In addition, according to an advantage of the present invention, the monitored activity is transmitted according to VID to caller profile server **50**. Where the call is transferred to a third-party system that performs the selected service option, that third-party system may

10 monitor activity and notify on hold system **42** and caller profile server **50** of the monitored activity. For example, a third-party system may provide a competition service.

In addition, after a caller selects a service option, the service is specified according to a caller profile accessible according to VID. By sharing on hold activity across multiple call centers, each call center may avoid repetition of services,

15 unless such repetition is preferred by a caller. For example, where a caller selects a music service, the music service is

20 specified not to play songs that the caller has already listened to within a particular period of time while on hold as indicated within the caller profile according to VID. In addition, the caller profile may indicate specific songs that the caller prefers to hear.

25

When a call is initially received into PBX **40** or on hold system **42**, where multiple call queues are utilized, the caller may be prompted by IVRU **41** to select from a menu of subject matters of the call. Depending on the subject matter selected, a

30 related one of call hold queues **46a-46n** is utilized to hold the call.

However, within the cycle of a single call, that call may be
placed in a single queue multiple times or multiple queues. In a
first case, a caller may inadvertently select the wrong subject
5   by entering a keypad entry or voice entry that is different than
the one intended. According to a second case, a caller may not
be able to discern which menu subject relates to the caller's
subject and therefore may not choose the necessary subject.
According to a third case, a caller may need to speak with
10   multiple representatives about multiple subjects in a single
call. Other cases where a caller may be placed in a single queue
multiple times or multiple queues are also relevant.

According to an advantage of the present invention, a caller
profile stored locally or remotely according to VID may include
15   the current call hold history of a caller. Where a call is
transferred from one call hold queue to another call hold queue,
the call is preferably adjusted in position within the queue
according wait times that have already occurred during the call.
Thus, if a caller has already waited forty minutes in a first
20   queue only to find out that the caller selected the wrong queue,
then some portion of the first hold time is utilized to adjust
the position of the caller in the second queue, such that the
caller does not lose all the time originally waited when
25   positioned in the second queue.

In particular, the caller profile according to VID is
utilized to calculate on hold points utilized to determine the
adjustment position within a queue. Different systems may
30   provide different amounts of adjustment depending on the reason
for holding or transferring. For example, a caller who has

waited in the wrong queue may not be given as many points for
minutes previously on hold as a caller is given who has waited
for a first representative and an additional representative is
required to fully answer a question.

5

    In particular, controller **60** may calculate on hold points
that are representative of current hold times dependent upon
factors including, but not limited to, the support policy of a
call center, the caller's standing, previous problem history, and
10 a reason for transferring between hold queues. A formula, such
as Apoints +' minutes * rate@ may be implemented to calculate the
on hold points, where the rate is determined by the above
factors. Further, on hold points may be calculated locally by
controller **60**, calculated remotely at a caller profile server,
15 and/or the points may be combined.

    With reference now to **Figure 5**, an illustrative portion of a
caller profile database within a caller profile server is
provided in accordance with the method, system, and program of
20 the present invention. As depicted, caller profiles **70** include
two caller profiles stored according to VID. Information
compiled in caller profiles **70** may be accessed from a single or
multiple locations for each of the VIDs. For example, one caller
profile may be stored at a first caller profile server and a
25 second caller profile stored locally. In another example, the on
hold music preferences according to each VID may be accessed from
a first third party server while the personal information
according to each VID is accessed from a second third party
server.

30

    In the examples, the identity of a caller, or the VID, is

specified by the name of the caller and a number to further
specify the name. In one example, the number may represent an
additional identifier, such as a social security number or other
government identification number.

5

      First, preferences for each caller are specified, in the
present example, according to music, news, and games.
Advantageously, by specifying on hold preferences in a caller
profile that is accessible across multiple hold centers according
10   to a single identifier, each hold center may automatically
specify music output to the caller according to the preferences
specified. In alternate embodiments, alternate types of
preferences may be specified. In addition, while in the present
embodiment generic preferences are specified, in alternate
15   embodiments, more specific preferences, such as weather in a
particular zip code, a particular song, a particular game, and
other such specifications, may be made.

      Next, personal information for each caller is specified. In
20   the example, personal information includes the sex, age,
education, occupation, and typical geographic region of the
caller. Personal information may be utilized by an on hold
system to tailor the services provided to a caller. For example,
instead of just offering a current weather service, a current
25   weather service for the caller's geographical region may be
offered. Further, advertising played to the caller may be better
targeted according to the age, sex, occupation, education, and
special needs of a caller.

30   Further, products and services purchased by a caller are
specified. For example, the computer, appliance or cable service

utilized by a caller may be recorded. The caller may specify
products and services for a caller profile or companies may share
product and service information in caller profiles.

5   In addition, a monthly wait history preferably indicates the
activity of a caller according to time, service, and specific
activity within the service. For example, caller ID A5124440000@
spent thirty minutes on hold listening to classical music. In
particular, songs A-G were played, where the titles or reference
10   numbers of songs A-G are provided. In addition, the call system
ID may be included with each entry of a monthly wait history.

        Moreover, a current wait history for each call is included
in a caller profile. The amount of time, the queue in which a
15   caller waits and the reason for transferring to another queue are
recorded in a caller profile. In addition, on hold points may be
calculated for a caller based on the number of minutes on hold
and the reason for transferring. Alternatively, each on hold
system may calculate on hold points based on number of minutes on
20   hold and the reason for transferring.
        Each on hold system may adjust the position of a call in a
queue that the call has been transferred to according to the on
hold points from a caller profile for the call. Therefore, a
caller does not lose the time already on hold when transferring
25   to another call hold queue is required.

        Moreover, a monthly time spent per representative may be
include in a caller profile. The monthly time spent per
representative may be utilized to better estimate a caller's time
30   left in the queue. In particular, even after a call transfers
from an on hold system to a representative terminal, the caller

activity is monitored.

    Referring now to **Figure 6,** there is an illustrative
embodiment of a shift in the position of a call in a hold queue
5   according to on hold points in accordance with the method,
system, and program of the present invention. In the examples
following, the progress of a caller VID A512-33-000@ (hereafter
referred to as A512@) is tracked through multiple hold queues
A#1@ and A#2@ where on hold points are utilized to adjust the
10 position of the call within hold queue #2.

    As depicted, hold queue information **72** include queue
information for hold queue #1. The A512@ call has been on hold
for sixty minutes within hold queue #1 before a representative is
15 able to answer the call. The caller has been connected with a
representative for two minutes.

    In the example, the A512@ call is transferred to a new call
queue, here hold queue #2. In particular the call is transferred
20 because hold queue #1 does not access representatives that can
meet the needs of the caller.
    Hold queue points may be calculated for the call according
to the amount of time the caller was on hold in hold queue #1.
In the example, a rate of A.5@ is utilized for the call. The
25 rate may be determined from multiple factors or may be assigned
by the representative transferring the call. Here, the rate is
determined from the factor that the caller chose the wrong
subject and therefore was placed in the wrong queue.

30 When the A512@ call is initially transferred to hold queue
#2, the call is received in the last position currently available

in hold queue #2 as illustrated at reference numeral **75** of hold queue information **74**. However, the on hold points for the call that are stored in the caller profile are preferably applied to the caller's position within hold queue #2.

Hold queue information **76** depicts the position of calls within hold queue #2 after the on hold points are applied for the A512@ call. In particular, in this example, thirty on hold points allow the caller to jump in position ahead of any callers who have waited less than thirty minutes. In alternate examples, the value of on hold points may translate into other amounts of adjustment of position within a hold queue.

In particular, on hold points that are not utilized by the end of a call are preferably stored with a caller profile according to a VID. If a particular caller calls the call center and is placed on hold within a particular period of time after the first call, then the on hold points may apply to the caller's position within the call queue. In another example, call centers may share on hold point information with the caller profile server such that one call center can adjust a caller's position within a hold queue if that caller has already been on hold in a separate call for a lengthy period of time at another call center. In either example, showing the caller that there is value associated with waiting will alleviate caller frustrations, particularly where the caller is spending a large portion of time each day waiting on hold.

With reference now to **Figure 7**, there is depicted a high level logic flowchart of a process and program for controlling a switching network in accordance with the method, system, and

program of the present invention. As illustrated, the process
starts at block **80** and thereafter proceeds to block **82.**

5   Block **82** illustrates a determination as to whether an off-
hook condition is detected in association with an originating
telephony device. If an off-hook condition is not detected, then
the process iterates at block **82.** If an off-hook condition is
detected, then the process passes to block **84.**

10   Block **84** depicts a determination as to whether a VID is
transferred from the off-hook device. The originating telephony
device may authenticate an identity for a caller. However, the
PSTN or other servers connected thereto may require additional
authentication within a trusted network for access to certain
15 types of services. If a VID is received and no additional
authentication is required, then the process passes to block **90.**
 If a VID is not received or if the PSTN requires additional
authentication, then the process passes to block **86.** Block **86**
illustrates transferring the call to an intelligent peripheral or
20 a telco application server for authentication. Block **88** depicts
a determination as to whether the VID and the call are returned
to the switching center. If not, then the process iterates at
block **88.** If the VID and the call are returned, then the process
passes to block **90.**

25

    Block **90** depicts looking up the caller profile according to
VID. The caller profile may be stored in a database within the
PSTN, in an extended network to the PSTN or in a network external
to the PSTN. Next, block **92** illustrates initiating services
30 designated in the caller profile retrieved according to the VID.
    Thereafter, block **94** depicts routing the call and the VID to a

destination device according to received digits or a voice
command, and the process passes to block **96.**

Block **96** illustrates a determination as to whether the
5   destination device is detected with a pick-up (off-hook)
condition. If the destination device does not pick-up, then the
process ends. If the destination device does pick-up, then the
process passes to block **98.**

10   Block **98** depicts a determination as to whether an RVID is
transferred from the destination device. If the RVID is
transferred, then the process passes to block **104.** If not, then
the process passes to block **100.** Block **100** illustrates
transferring the call to an intelligent peripheral or telco
15   application server. Next, block **102** depicts a determination as
to whether an RVID and call are received back at the switching
center. If not, then the process iterates at block **102.** When
the RVID and call are received, then the process passes to block
104.
20

Block **104** illustrates initiating services designation in a
caller profile associated with the RVID. Next, block **106** depicts
transferring the RVID to the originating device for output to the
caller. Thereafter, block **108** illustrates proceeding with the
25   call, where additional services are applied when applicable, and
the process ends.

With reference now to **Figure 8,** there is depicted a high
level logic flowchart of a process and program for controlling a
30   PBX system within a call center in accordance with the method,
system, and program of the present invention. As illustrated,

the process starts at block **110** and thereafter proceeds to block **112**.

Block **112** depicts a determination as to whether a new call
5   is received. If a new call is received, then the process passes
to block **118**. If a new call is not received, then the process
passes to block **114**. Block **114** illustrates a determination as to
whether or not a call processing request is received. When a
call is at the top of the call queue, the call is preferably
10 transferred back to the PBX with a call processing request. If a
call processing request is not received, then the process passes
to block **112**. If a call process request is received, then the
call is transferred to the next available representative with a
VID, as depicted at block **116**, and the process ends.

Block **118** illustrates a determination as to whether or not a
representative is available. If a representative is available,
then the call is transferred to the next available representative
with a VID, as illustrated at block **120**, and the process ends. If
20 a representative is not available, then the process passes to
block **122**. Block **122** illustrates distributing the call to the on
hold system with the VID, and the process ends.

Referring now to **Figure 9**, there is illustrated a high level
25 logic flowchart of a process and program for controlling an on
hold system in accordance with the method, system, and program of
the present invention. As depicted, the process starts at block
130 and thereafter proceeds to block **132**.

30 Block **132** illustrates a determination as to the type of
event that occurred when an event occurs. If a new call is

received, then the process passes to block **134**. If a caller
participates in on hold services, then the process passes to
block **160**.

5   Block **134** depicts placing the call in a call queue. Next,
block **136** illustrates a determination as to whether local and/or
remote caller profile storage is utilized. Both local and remote
caller profile storage maybe utilized concurrently. If local
caller profile storage is utilized, then the process passes to
10   block **138**. If remote caller profile storage is utilized, then
the process passes to block **146**.

Block **138** illustrates comparing the VID of the call with the
local caller profile database. Next, block **140** depicts a
determination of whether a VID matches with a VID for a caller
15   profile in the local caller profile database.

If a VID does not match, then the caller is prompted to
start a caller profile via a voice script or at a web page, as
illustrated at block **144**, and the process passes to block **154**.
20   In particular, regardless of whether a caller starts a profile,
profile building for a VID may begin for the current call.

If a VID does match, then the process passes to block **142**.
25   Block **142** depicts specifying the caller hold options according to
the caller profile, and the process passes to block **154**.

Block **146** depicts transmitting the request to the caller
profile service for a caller profile according to the VID. Next,
block **148** illustrates a determination as to whether or not a
30   caller profile is available from the caller profile server for
the VID. If a caller profile is not available, then the process

passes to block **144**.   If a caller profile is available, then the
process passes to block **150**.

Block **150** illustrates updating the local caller profile
5   database with the available caller profile for the VID.   Next,
block **152** depicts specifying the caller hold options according to
the caller profile, and the process passes to block **154**.

Block **154** depicts a determination as to whether a caller
10   profile includes current hold points or multiple holds during the
current call.   If a caller profile does not include current hold
points or multiple holds during the current call, then the
process ends.   If a caller profile does include current hold
points or multiple holds during the current call, then the
15   process passes to block **156**.   Block **156** illustrates adjusting the
call queue position of the call according to the current hold
points or multiple holds during the current call.   Each on hold
system may make a particular number of adjustments in position of
a caller dependent upon the on hold systems needs.   Next, block
20   **158** depicts updating the caller profile according to the
adjustment in position and hold point usage, and the process
ends.

In response to detecting a caller participating in on hold
25   services, block **160** depicts monitoring the time spent on each
service utilized by the caller while on hold.   Next, block **162**
illustrates updating the local caller profile database with the
monitored times according to VID.   Thereafter, block **164** depicts
transferring the monitored times to the caller profile service
30   according to the VID, and the process ends.

With reference now to **Figure 10**, there is illustrated a high
level logic flowchart of a process and program for controlling a
caller profile server in accordance with the method, system, and
program of the present invention. As depicted, the process
5   starts at block **170** and thereafter proceeds to block **172**.

Block **172** illustrates a determination as to the type of
event that occurred when an event occurs. If a request for a
caller profile according to caller ID is received, then the
10   process passes to block **174**. If a new caller profile entry is
received, then the process passes to block **190**. If monitored on
hold service activity is received, then the process passes to
block **192**.

Block **174** depicts comparing the call center VID with the
call center database. Next, block **176** illustrates a
determination as to whether the call center is verified by the
VID. If the call center is not verified, then a subscription
services option is transmitted to the caller center, as depicted
20   at block **178**, and the process ends. If the call center is
verified, then the process passes to block **180**.

Block **180** illustrates comparing the caller VID with the
caller profile database. Next, block **182** depicts a determination
25   as to whether a caller profile is available for the caller VID.
If a caller profile is not available for the caller VID, then an
indicator is transmitted to the call center indicating that the
caller profile is not available, as illustrated at block **184**, and
the process ends. If a caller profile is available, then the
30   process passes to block **186**.

Block **186** depicts filtering the caller profile according to the subscription service for the call center. Next, block **188** illustrates transmitting the filtered caller profile to the requesting call center, and the process ends.

In response to receiving a new caller profile entry, block **190** illustrates adding the new caller profile entry to the caller profile database according to a caller VID, and the process ends. In particular, a new caller profile may be received from a call center, received via a web page entry, or received via a voice entry.

In response to receiving monitored on hold service activity, block **192** depicts updating the caller profile database with the monitored on hold service activity according to caller VID. In particular, the monitored on hold service activity may include the monitored times, general services, and activity within the service.

It is important to note that while the present invention has been described in the context of a fully functioning data processing system, those of ordinary skill in the art will appreciate that the processes of the present invention are capable of being distributed in the form of a computer readable medium of instructions and a variety of forms and that the present invention applies equally regardless of the particular type of signal bearing media actually used to carry out the distribution. Examples of computer readable media include recordable-type media, such as a floppy disk, a hard disk drive, a RAM, CD-ROMs, DVD-ROMs, and transmission-type media, such as digital and analog communications links, wired or wireless

communications links using transmission forms, such as, for
example, radio frequency and light wave transmissions. The
computer readable media may take the form of coded formats that
are decoded for actual use in a particular data processing
5   system.

While the invention has been particularly shown and
described with reference to a preferred embodiment, it will be
understood by those skilled in the art that various changes in
10   form and detail may be made therein without departing from the
spirit and scope of the invention.